## REMARKS

Favorable reconsideration and allowance of the claims of the present application are respectfully requested.

Applicants observe that Claims 1-3, 6-11, 14-27, 30-35, 38-40 and 49-58 are pending in the present application and that all the pending claims are rejected in the outstanding Official Action. Applicants further observe that this Response represents a Submission under 37 C.F.R. §1.114 which is being filed concurrently with a Request for Continued Examination (RCE). Also included within this Submission are three Declarations under 37 C.F.R. §1.132, namely the Wang Declaration, the Li Declaration and the Wei Declaration.

**A. Summary of Amendments to the Pending Claims**

Before addressing the substantive grounds of rejection raised in the outstanding Office Action, Applicants have amended independent Claims 1, 9 and 17 by removing the optional element, e.g., the outlet zone, for those claims. Claims 25 and 33, which depend on Claims 1 and 9, respectively, have been amended in a similar manner, i.e., the optional element has been removed from Claims 25 and 33. Applicants have also added new Claims 59-63 which positively recite the presence of the outlet zone, which has been deleted from Claims 1, 9, 17, 25 and 33. The above amendments to Claims 1, 9, 17, 25 and 33, necessitated Applicants to amend Claims 2, 6, 8, 14, 16, 22, 24, 26, 32 and 40 in the manner indicated supra.

In addition, Applicants have deleted Claim 55 without prejudice. Applicants are not conceding in this application that Claim 55 is not patentable over the art cited by the Examiner, as the present claim amendments and cancellations are only for facilitating expeditious prosecution of an embodiment of the invention. Applicants respectfully reserve the

right to pursue this and other claims in one or more continuation and/or divisional patent applications.

Applicants have also added new Claims 64 and 65. Support for newly added Claim 64 is found throughout the instant application. See, for example, previously presented Claim 1, page 8, lines 7-8, Table 3 at page 17, Table 5 at page 19, Table 7 at page 21, and Table 8 at page 22 of the originally filed specification. Support for newly added Claim 65 is also found throughout the originally filed application. See, for example, previously presented Claims 1-3, and 6-8.

Since the above amendments to the claims do not introduce new matter into the application, entry thereof is respectfully requested.

**B. Rejections Raised in the Outstanding Office Action**

Claims 1-3, 6-7, 9-11, 14-15, 17-23, 25-27, 30-31, 33-35, 38-39, 49-51, and 54-57 stand rejected, under 35 U.S.C. §103(a) as allegedly unpatentable over Kmecak et al. (EP 0,171,460) in view of Williams (US 4,422,925). Claims 8, 16, 24, 32 and 40 stand rejected, under 35 U.S.C. §103(a) as allegedly unpatentable over Kmecak et al. in view of Williams, as applied to Claims 1, 9, 17, 25 and 33 above, and further in view of Watts (US 2,377,657). Claims 52, 53 and 58 stand rejected, under 35 U.S.C. §103(a) as allegedly unpatentable over Kmecak et al. in view of Williams, as applied to Claim 1 above, and further in view of Carr et al. (US 3,639,228).

**C. Examiner's Basis for Alleging Obviousness**

Applicants observe that each of the three outstanding obviousness rejections is predicated upon a combination of applied references that includes at least Kmecak et al., as the principal applied reference, and Williams, as the secondary applied reference. The tertiary

applied references of Watts and Carr et al. allegedly render Applicants' independent claims unpatentable.

In the outstanding Office Action, the Examiner avers that Kmecak et al. discloses a riser reactor and a corresponding process of conducting a hydrocarbon cracking reaction in the riser reactor. The Examiner further avers that although Kmecak et al. does not teach the specific diameter ratio for the second reaction zone and the first reaction zone as presently claimed, a person skilled in the art would be motivated to optimize and modify such a diameter ratio in view of Williams, because Williams teaches that "[t]he length and diameter of the various sections of reactor 2 are proportioned to maintain a desired reaction time in each section." See column 4, lines 27-29 of Williams.

**D. Reasons for Patentability**

I. No Motivation to Combine

Applicants respectfully submit that the combination of Kmecak et al. and Williams does not teach or suggest Applicants' claimed riser reactor that includes two reactor zones wherein the ratio of a second reaction zone diameter to a first reaction zone diameter is in the range from 1.5:1 to 5:1. Applicants observe that the claimed diameter ratio is critical in obtaining an unexpected result as shown in the present invention. That is, the claimed reactor provides a significant reduction of olefin in gasoline, while simultaneously promoting increased production of a desired product, i.e., iso-paraffin, without causing over-cracking. This unexpected result will be described in greater detail herein below.

Kmecak et al. discloses a riser reactor that is primarily designed to use dry gas (containing little $C_{3+}$ and almost no $C_{5+}$) as the lift gas at the bottom of a fluidized catalytic cracking (FCC) riser reactor to achieve lower coke production and better product selectivity.

There is no disclosure in Kmecak et al. with respect to employing the riser reactor for olefin reduction. Further, the riser reactor disclosed in Kmecak et al. would not achieve effective reduction of olefin and simultaneous production of desirable products in any event. In the first instance, the riser reactor of Kmecak et al. is designed to have an expanded (e.g., larger diameter) portion which provides a high temperature and a short contact time (i.e., residence time). See page 40, lines 15-21. Kmecak et al. teaches that the contact time should be no more than 3 seconds (see page 41, lines 7-10), and the short contact time can reduce the tendency of over-cracking to occur. See page 49, lines 20-24. Applicants submit that if one were to alter the structural design of the reactor of Kmecak et al. in order to have a longer contact time such as allegedly suggested in Williams, this would have led to over-cracking according to Kmecak et al. (page 49, lines 20-24), thereby rendering Kmecak et al. unsatisfactory for its intended purpose and changes its principle of operation.

Clearly, there is no motivation to combine the disclosure of Williams with Kmecak et al. since such a combination would lead to an adverse result, e.g., over-cracking in the reactor design in Kmecak et al. "Proposed modifications cannot render the prior art unsatisfactory for its intended purpose or change the principle of operation of a reference". See MPEP 2143.01.

Applicants further observe that at col. 2, lines 13-18 of Williams, it is disclosed that "[t]he products of the process of this invention contain a relatively greater proportion of olefins suitable for alkylation or other petrochemical processes ... hydrocarbons". This teaching of increased olefin production in Williams is a clear teaching away from the results that are obtained using Applicants' claimed riser reactor, i.e., reduction of olefin in gasoline. As such,

the combination of Williams and Kmecak et al. would lead to a reactor design that provides a high olefin content since this is the objective of Williams.

Even assuming *pro argundo* that a person skilled in the art would combine Kmecak et al. and Williams, which is clearly not the case as discussed above, such a combination would not arrive at the presently claimed riser reactor. Specifically, a person skilled in the art, when reading col. 4, lines 27-29 of Williams would modify the diameter and length of each section of the reactor disclosed in Kmecak et al. proportionally. Therefore, when a person skilled in the art modifies a ratio of the second reaction zone diameter to the first reaction zone diameter in the range of 1.5:1 to 5:1, he would, based on the disclosure of Williams, also apply the exact same ratio range to the length of the second reaction zone and the first reaction zone. In other words, according to a person skilled in the art, the modified reactor should have the ratio of the length of the second reaction zone relative to the first reaction zone as 1.5:1 to 5:1 However, the ratio of second reaction zone length to first reaction zone length, as presently claimed, is in the range of 2:1 to 3:1 (the calculation is based upon item b and c of pending Claim 1 where 60%/30% is equal to 2:1, and 30%/10% is equal to 3:1). Therefore, the modified reactor according to the teaching of the cited references is not the same as the presently claimed reactor. As such, Applicants submit that the combined teaching fails to arrive at the present application.

The Supreme Court in KSR International Co., v. Teleflex, Inc., 127 S.Ct 1727 (2007), emphasizes the importance of identifying "a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in a way the claimed new invention does." KSR at 1741. In view of the above remarks, Applicants submit that a person skilled in the

art would not have reason or motivation to combine the two cited references, let alone have a reasonable expectation to arrive at the present claimed invention.

The above remarks are further bolstered by the fact that the claimed reactor design of the present application, turns out to be a synergistic agglomeration of dimensions and ratios that, under commercial operation, permits one to favor one particular product profile without adversely affecting other desirable product production, and in fact can even permit simultaneous favoring of multiple products unlike the art, which unique result is a direct function of the specific shape and sizes, as presently claimed

II. Unexpected Results

a. Discussion of Previously Submitted Declaration of Dr. Xu

Applicants observe that in the outstanding Office Action, the Examiner has considered the unexpected result, e.g., reduced olefin production and increased iso-paraffin production, discussed in the Declaration executed by Dr. Youhao Xu, which was submitted to the U.S. Patent and Trademark Office on April 4, 2008 ("the Xu Declaration"), however, the Examiner now cites U.S. Patent No. 5,167,795 to Gartside ("Gartside") to rebut the data discussed therein.

Specifically, in Item 7 of the Xu Declaration, the criticality of the ratio of diameters of the second reaction zone versus the first reaction zone was evaluated by comparing a riser reactor having a diameter ratio of 1.2:1 (outside of the present claimed range), with riser reactors having ratios within the present claimed range. It was found that the reactor, with a ratio of 1.2:1, only reduced olefin to a level of 40.69% by weight (as opposed to 20.51-28.56% by weight for reactors having ratios within the presently claimed range), and produced iso-paraffin

to a level of 21.33% by weight (as compared to 34.8 - 43.86% by weight for reactors having ratios within the present claimed range).

In response to the above-described unexpected result, as shown in the Xu Declaration, the Official Action asserts that Gartside teaches that shorter residence time and higher temperatures favors olefin production, whereas longer residence times and lower temperatures favor paraffin production due to an increase in hydrogen transfer activity. As such, the Official Action asserts that a person skilled in the art would modify the diameter of the first and second reaction zones in the apparatus of Kmecak et al., as taught by Williams, and further apply the teaching from Gartside, to achieve an optimum conversion of a specified hydrocarbon feedstock into the desired distribution of products.

In response, Applicants submit that reliance on Gartside is inappropriate in assessing the results or the degree of improvement achieved by the claimed riser reactor. First, Gartside teaches a top-down flow tubular reactor (see column 4, lines 38-47), which is completely different from an upflow FCC riser reactor as presently claimed. Second, the teaching of Gartside is limited to the transition from pyrolysis to cracking, rather than the transition within the cracking process, as is the case of Applicants' claimed riser reactor. Specifically, as evidenced by Table I of Gartside, when the residence time and reactor temperature of pyrolysis is, respectively, increased from 0.3 seconds to 2.0 seconds, and reduced from 816°C to 565°C, a transition from pyrolysis to cracking occurs, and the ratio of paraffin to olefin is improved from 0.05 (the pyrolysis step) to 0.73 (the cracking step). This shows that longer residence times and lower temperatures favor paraffin production over olefin only in the context of changing from pyrolysis to cracking. Gartside further teaches that when the residence time within a cracking process is reduced from 2 seconds to 0.9 seconds, and the temperature is

reduced from 565°C to 510°C, the ratio of paraffin to olefin is improved from 0.73 to 1.14. This result, at most, appears to suggest that shorter residence times and lower temperatures may favor paraffin production over olefin, but this is clearly different from longer residence times and lower temperatures, as disclosed, and in some instances claimed, in the instant application.

Furthermore, when the residence time is reduced from 2 seconds to 0.15 seconds, and the temperature is reduced from 565°C to 540°C, the ratio of paraffin to olefin is reduced from 0.73 to 0.46. This result appears to suggest that shorter residence time and lower temperature may disfavor paraffin production over olefin, which is also different from what is disclosed, and in some instances claimed, in the instant application.

Therefore, considering the different and contradictive effects of residence time and temperature on the production of paraffin over olefin in the cracking process, which were observed in a top-down flow tubular reactor, Gartside is irrelevant and unpredictable to assessing the results or the degree of improvement achieved by the claimed riser reactor.

As such, Applicants submit that neither Gartside alone, nor the combination of Kmecak et al., Williams, and Gartside, teaches the unexpected result of the present invention.

b. Declaration of Mr. Wang

To further demonstrate unexpected results of the claimed riser reactor, Applicants submit a Declaration under 37 C.F.R. §1.132 executed by Xieqing Wang ("the Wang Declaration"). Mr. Wang is an internationally recognized expert in the field of Fluidized Catalytic Cracking (FCC) technology and his qualifications are provided in paragraphs 2 to 5 of the Wang Declaration. A list of publications bearing his name is attached as Exhibit A of the Wang Declaration.

Mr. Wang attests that the presently claimed FCC riser reactor has achieved significant reduction of olefin in the gasoline from a level of 40% -60% by weight to a level of

10%-30% by weight, and such result would have been unexpected to those skilled in the art. See paragraphs 7-8 of the Wang Declaration. The reasonings for the above conclusion is set forth below.

First, prior to the filing date of the present application, Mr. Wang attests that there was no single riser reactor in the FCC field that could effectively reduce the content of olefin in gasoline and simultaneously produce more desirable products. See paragraph 11 of the Wang Declaration.

The claimed FCC riser reactor is a new type of FCC reactor that has achieved significant reduction of olefin in gasoline and simultaneous improved product profile, without causing over-cracking. The claimed FCC riser reactor is designed to have two reaction zones, a first (lower) reaction zone and a second (upper) reaction zone. Characteristic features of the claimed reactor include, among other things, a ratio of diameter (i.e., the diameter of the second reaction zone relative to the diameter of the first reaction zone) that is in the range from about 1.5:1 to about 5:1. This structural design allows for a short residence time in the first reaction zone and a longer residence time, i.e., longer than 3 seconds, or even 5 seconds or greater, in the second reaction zone. Given this design, heavy hydrocarbon feedstock is cracked in the first reaction zone at a high temperature and a short residence time into a lighter hydrocarbon feedstock and olefin; then, in the second reaction zone where the diameter is larger than that of the first reaction zone, the olefin produced in the first reaction zone is effectively converted to iso-paraffin at a lower temperature during a longer residence time through hydrogen transfer reactions, etc. See paragraph 9 of the Wang Declaration.

In contrast, no prior art reactor could effectively achieve the above-described effect in one single riser reactor. For example, Kmecak et al. is designed to use dry gas

(containing little $C_{3+}$ and almost no $C_{5+}$) as the lift gas at the bottom of a FCC riser to achieve lower coke and a better product selectivity. There is no disclosure in Kmecak et al. with respect to employing the riser reactor for olefin reduction. Further, the riser reactor disclosed in Kmecak et al. would not achieve effective reduction of olefin and simultaneous production of desirable products in any event. In the first instance, the riser reactor of Kmecak et al. is designed to have an expanded (e.g., larger diameter) portion which provides a high temperature and a short contact time (i.e., residence time). See page 40, lines 15-21. Kmecak et al. teaches that the contact time should be no more than 3 seconds (see page 41, lines 7-10), and the short contact time can reduce the tendency of over-cracking to occur. See page 49, lines 20-24. In contrast to the claimed reactor of the present application, the riser reactor of Kmecak et al. allowing for only a short contact time would not be effective in reducing olefin, especially high levels (40-60% wt) of olefin. If one were to alter the structural design of the reactor of Kmecak et al. in order to have a longer contact time, this would have led to over-cracking according to Kmecak et al. (page 49, lines 20-24), thereby resulting in a decrease in the production of valuable products. See paragraph 12 of the Wang Declaration.

Mr. Wang further attests that the extent of reduction of olefin and promotion of the production of desired product, such as iso-paraffin, as achieved by the present claimed riser reactor, would be unexpected to a person skilled in the art. Specifically, the presently claimed FCC riser reactor can reduce the content of olefin to a level below 30% by weight (15.17 wt%, 20.51 wt %, and 28.11 wt %, as exemplified in Examples 3, 2 1, and Table 7, 6, 4, respectively, in the original filed specification), and simultaneously produce iso-paraffin at an amount of over 36% by weight (36.0 wt %, 41.83 wt %, and 43.86 wt %, respectively). In contrast, the amount of olefin and iso-paraffin in the gasoline produced from a conventional FCC riser reaction is

56.49% by weight and 11.83% by weight, respectively (see the Comparative Example 1 at Table 4 of the originally filed specification). See paragraphs 15-16 of the Wang Declaration.

Furthermore, Mr. Wang attests to the unexpected result of Item 7 of the Xu Declaration which has been discussed above. Specifically, Mr. Wang attests that the significance of the diameter ratio is apparent and substantial from the data disclosed therein. See paragraph 17 of the Wang Declaration.

Mr. Wang further attests that there is a great need in China to develop new FCC technology which can effectively reduce the amount of olefin in gasoline. Specifically, Mr. Wang attests that in China, about 80% of commercial gasoline is produced by using the FCC technology, and the gasoline produced by such technology has a high content of olefin, for example, 40-60% by weight, as compared to less than 30% by weight seen in most other countries. He further attests that it is becoming increasingly necessary to reduce the content of olefin from gasoline produced by FCC technology in order to meet current environmental regulations. Significantly, the claimed FCC riser reactor application achieves a significant reduction of the olefin content in gasoline from a level of 40%-60% by weight to a level of 10%-30% by weight.

As such, the Wang Declaration concludes that the dramatic and effective reduction of olefin in gasoline and simultaneous promotion of the production of iso-paraffin in gasoline, achieved by the present claimed riser reactor, is entirely unexpected in the FCC field.

III. Commercial Success of the Claimed Riser Reactor

In addition to the unexpected results as discussed above, Applicants submit that the claimed riser reactor has achieved substantial commercial success. Evidence of commercial success can be strong evidence that the invention was not obvious to those skilled in the art at the

time the invention was made. See, e.g., Glaxo Wellcome, Inc. v. Pharmadyne Corp., 32 F. Supp. 2d 265, 303 (D. Md. 1998). See, also, *KSR*, 127 S.Ct. at 1730. Further, according to the Federal Circuit, a nexus between an invention and commercial success of a product embodying the invention should be presumed "if the marketed product embodies the claimed features, and is coextensive with them, then ... the burden shifts to the party asserting obviousness to present evidence to rebut the presumed nexus." Brown & Williamson Tobacco Corp. v. Philip Moriss Inc., 229 F.3d 1120, 1130 (Fed. Cir. 2000).

In this regard, Applicants submit two declarations, namely the Li Declaration and the Wei Declaration.

In the Li Declaration, Mr. Li attests that he is in charge of implementing new technologies in refineries at SINOPEC. One such technology implemented by Mr. Li was the Maximizing Iso-Paraffin (MIP) apparatus, which is the riser reactor claimed in the present application (see paragraph 7 of the Wang Declaration), to refinery companies in China. Mr. Li further attests that the technical feature of the MIP apparatus is that it is able to dramatically decrease the olefin content in gasoline through a creative design of a stepped riser, e.g., the claimed riser reactor, also known as the MIP apparatus. The MIP apparatus includes two reactor zones wherein the first (lower) reaction zone is designed for high temperature and short residence time to produce olefins from cracking hydrocarbons, and the second (upper) reaction zone is designed for low temperature and long residence time to transform olefins into iso-paraffin. Consequently, these technical features bring advantages to the users of the apparatus, for example, significant olefin reduction, while simultaneously producing iso-paraffin as well as low revamp cost and low energy consumption as compared to conventional riser reactors. Due to the synergism of olefin reduction and iso-paraffin production, lower revamp cost and lower

energy consumed, the claimed riser reactor has received high acclamation from many refineries. See paragraphs 3-4 of the Li Declaration.

Mr. Li also attests that a total of 32 MIP apparatus, 24 of which are presently operating and producing product, and the others are under construction. Mr. Li further attests that all of the customers which have adopted the claimed riser reactor in their refineries are highly satisfied with the claimed riser reactor since the same effectively reduce the olefin in gasoline, while simultaneously enhancing the yield of desirable products. These customers are also satisfied with the ease of operating the claimed riser reactor, as well as the low cost and decreased energy consumption associated with the claimed riser reactor.

Mr. Li even further attests that there are a total of 40 apparatus in China capable of reducing olefin content in gasoline, of which the claimed riser reactor accounts for 32 of the 40 apparatus, i.e., 80% of the market share; the other eight apparatus are Two-Stage Riser Fluidized Catalytic Cracking apparatus also known as "TSRFCC" reactors. See paragraphs 5-6 of the Li Declaration.

With respect to the Wei Declaration, Mr. Wei attests that he is in charge of the industrial Fluidized Catalytic Cracking (FCC) unit in his company's refinery, particularly including its operational performance such as, for example, gasoline quality, product distribution, and energy consumption. Due to the chemical nature of catalytic cracking reactions, the olefin content in gasoline within his company's FCC unit was rather high. In order to reduce the olefin content in gasoline produced in his company's refinery, different solutions to the problem were implemented.

Mr. Wei attests that in 1999, special catalysts were initially employed in an attempt to reduce the olefin content in gasoline; this initial attempt in olefin reduction was

limited, and the yield of valuable products was decreased. In 2004, a Two-Stage Riser Fluidized Catalytic Cracking (TSRFCC) technology developed by China University of Petroleum was employed in a continued attempt to reduce the olefin content in gasoline. The TSRFCC technology encountered numerous problems which hindered smooth operation of his company's refinery. Moreover, Mr. Wei's company experienced a decrease in the yield of valuable products, and the TSRFCC technology increased energy consumption within the FCC unit. In 2006, Mr. Wei's company purchased and employed a maximizing iso-paraffin (MIP) apparatus (i.e., a fluidized catalytic cracking riser reactor for maximizing iso-paraffin) from Research Institute of Petroleum Processing (RIPP), SINOPEC. As attested thereto, the employment of the MIP apparatus provided a dramatic reduction in olefin content in gasoline, as well as an increase in the production of valuable products and lower energy consumption compared with the other technologies used at his company.

In view of the above remarks, Applicants submit that the commercial success of the present claimed riser reactor, also known as the MIP apparatus, has been established.

IV. Conclusion

In sum, Applicants respectfully submit that Kmecak et al. does not teach the specific diameter ratio as presently claimed. Further, a person skilled in the art would have no motivation or any reason to optimize and modify such a diameter ratio to arrive at the claimed invention based on either Kmecak et al. or Williams, or the combination thereof. In fact, as discussed, any alteration of the reactor disclosed by Kmecak et al. or Williams based on the teachings of these references would be against the principle of operation taught in the references. Moreover, the results achieved by the claimed reactor would have been unexpected, as supported

by the Xu Declaration (previously submitted) and the Wang Declaration. The unobvious nature of the claimed reactor is further evidenced by commercial success, discussed *supra*.

Therefore, the conclusion is compelling that the present application is non-obvious over the cited references of Kmecak et al. and Williams. As such, Applicants have obviated the §103 (a) rejection citing those two references. Reconsideration and withdrawal of the instant rejection are thus respectfully requested.

With respect to the other obviousness rejections raised in the outstanding Office Action in which one of Watts and Carr et al. is combined with the combination of Kmecak et al. and Williams, Applicants submit that the inclusion of the disclosures of one of Watts and Carr et al. to the combination of Kmecak et al. and Williams does not alleviate the defects mentioned above with respect to the combination of Kmecak et al. and Williams. Specifically, neither Watts, nor Carr et al. teach or suggest any of the aspects of the claimed riser reactor discussed above. As such, the combination of Kmecak et al. and Williams with one of Watts and Carr et al. does not render Applicants' claimed riser reactor obvious. Reconsideration and withdrawal of the instant §103 rejections are thus respectfully requested.

**E. Comments for Patentability of new Claims 64 and 65**

With respect to newly added Claim 64, Applicants submit that in addition to the distinctions to the cited references as discussed above, there is another technical feature, e.g., "residence time of no less than five seconds", which further distinguishes that claim from the cited references.

Applicants observe in this regard that that the residence time ("T") is a function of the design of an FCC reactor. Specifically, for a given reactor, the residence time determines the length and diameter of the reactor, for example, T = F (length of the reactor, diameter of the reactor). If volume flow rate of the inlet and outlet of the reactor (Vi and Vo, e.g., the processing

capacity of the reactor at the inlet and the outlet), the residence time (T), and the length of the reactor (L) are known, the diameter of the reactor (D) can be calculated by the following formula:

$T = L/Um$ (Um is the average velocity) $\rightarrow$ Um is determined.

$Um = (Uo - Ui)/\ln(Uo/Ui) = [(Vo/F) - (Vi/F)]/\ln [(Vo/F)/(Vi/F)] \rightarrow$ F is determined. (Uo and Ui is the velocity of the inlet and outlet of the reactor respectively. F is the cross-sectional area of the reactor)

$F = \frac{1}{4} * \pi * D^2 \rightarrow$ D is determined.

Therefore, the above calculation shows that the residence time is a function of the structure of the FCC reactor.

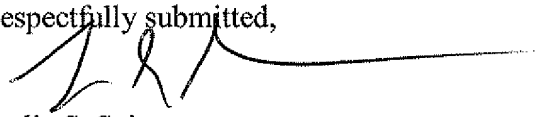
Furthermore, Applicants submit that Kmecak et al. teaches that the residence time is 0.5-3 seconds. See page 40, lines 19-21, page 41, lines 7-12; page 49, lines 7-24; and page 51, line 24 to page 52, line 5. In contrast, the residence time recited in newly added Claim 64 is "no less than five seconds". Therefore, Kmecak et al. teaches away from the present reactor recited in newly added Claim 64. As such, a person skilled in the art would not apply Kmecak et al. in the first place. Even assuming that Kmecak et al. would be applied, which is clearly not the case as discussed above, the combination of Kmecak et al. with Williams and other cited references would not arrive at the present application, because the modified reactor cannot change the principle of operation of Kmecak et al., which means that the residence time is not greater than three seconds, as opposed to "no less than five seconds" as presently claimed. See MPEP 2143.01 V and VI, "the proposed modification cannot render the prior art unsatisfactory for its intended purpose or change the principle of operation of a reference."

In view of the above remarks, Applicants submit that Claim 64 is non-obvious over all cited references taken singularly in combination.

With respect to the newly added Claim 65, Applicants submit that in addition to the distinctions to the cited references as discussed above, the particular reactor design as recited in Claim 65 is a synergistic agglomeration of dimensions, angles and ratios that, under commercial operation, permits one to favor one particular product profile without adversely affecting other desirable product production, and in fact can even permit simultaneous favoring of multiple products unlike the art, which unique result is a direct function of the specific shape and sizes, as presently claimed.

Thus, in view of the foregoing amendments and remarks, it is firmly believed that the present case is in condition for allowance, which action is earnestly solicited.

Respectfully submitted,



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